

Challenges and Opportunities of Technology Based Instruction in Open and Distance Learning: A Comparative Study of Tanzania and China

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Abstract

This paper presents challenges and opportunities of technology based instruction in Open and Distance Learning (ODL) institutions particularly at the Open University of Tanzania (OUT) and Center for Continuing and Distance Education (CCDE -China). The paper developed out of a cross sectional survey design study with a mixed approach of qualitative and quantitative methods to collect and analyze data. A total of 144 (83-OUT; 61-CCDE) respondents from both institutions were involved in the study with a subpopulation of students, instructors and technical staffs. Main data instrument was questionnaire followed by focus group discussion. Quantitative data were analyzed using SPSS v.17, whereas qualitative data were reduced into main themes and reported accordingly. The findings revealed that CCDE institution is far better than OUT in the practice of technology based instruction due to some favorable conditions that support technology based instruction. Either, OUT instructors, have better access to computer and internet than their students although despite the access, instructors are not active initiators and implementers of technology based instruction and learning. Generally, participants from both institutions have positive attitude and even acknowledged the opportunities of using technology in ODL. There are some challenges which seem to affect both institutions although at a varied extent, OUT being at a stake than CCDE. The paper concluded by suggesting that OUT should opt some of the CCDE strategy to successfully implement e-learning. In addition, the use of blended technology is crucial in increasing the access to e-learning materials especially under situations like slow internet or lack of internet connectivity.

Keywords

Technology based instruction; Open and Distance learning; e-learning; challenges of technology based instruction; opportunities of technology based instruction.

1. Introduction

Open and distance learning (ODL) is now becoming significant all around the world in contemporary educational development including Tanzania and China as an alternative way to meet the huge unmet demand for educational at all levels and especially for higher education. The use of educational technologies in distance education has the potential in addressing most of the challenges that distance learners encounter in their learning which sometimes are so pressing

to the extent that some distance learners opt to withdraw from studies and others delay to graduate (Carr, 2000; Galusha, 1997). Those challenges include lack of effective communication and interaction between instructors and students and delays in delivery of study materials /assignments (Nihuka & Voogt 2011).

In this case, technology- based instruction refers to the use of technology to facilitate effective learning. This involves some components necessary to support effective learning which are access to learning materials, development of structures that attract attention and keep the learner on task, structure that assist students in understanding the facets of the learning experience and a level of interaction among learners, and between the learner and the information to ensure a valuable learning experience (Duchastel,1994).

Despite notable potential of technology in ODL, many challenges loom concerning the use of technology and thus printed materials still dominate the teaching and learning process especially in developing countries. Like other developing countries, China and Tanzania are affected by those challenges to a greater or lesser extent despite their efforts to integrate technology in the delivery of distance education that means distance learners continue to experience some difficulties in learning.

2. Purpose of the Study

At these times of technological driven era and reforms in education delivery whereby distance education is becoming an alternative way to reach more students, it is vital to assess and monitor the challenges and opportunities of technology use in education and ways by which institutions use to address those challenges to improve education delivery.

The purpose of the study was to identify and compare challenges and opportunities of technology based instruction in Open and Distance Learning (ODL) in Tanzania (OUT-HQ & Dar es salaam regional centres) and China (CCDE NENU-Changchun-China). Accordingly, the following research questions guided the study:

- What are the current forms of technology based instruction used at OUT and CCDE?
- What are the available institutional factors (human, policy, &infrastructure) to support technology instruction/ learning at OUT and CCDE?
- What are the challenges and opportunities of technology based instruction between OUT in Tanzania and CCDE in China?
- What strategies do ODL institutions (OUT & CCDE), use for effective implementation of technology based instruction in the provision of Distance education.

3. Literature Review

3.1 Forms of Educational Technology Used In Learning

Educational technology refers to the use of different types of technologies to facilitate, enhance and support teaching and learning. Different scholars identify different forms of educational technologies that are used around the world to facilitate instruction and learning. Such educational technologies include: computers, internet, mobile phones, TV/LCD, audio/visual cassettes, CDs, DVDs, blogs, wikis, podcasts and social networks (referred as web 2.0) and

televisions, radio, one way video conferences, emails, and discussion forums which are referred as web 1.0 (Chen & Bonk, 2008; Usluel & Mazman, 2009; Maro,2008).

Blogs are reported to be used in China for students' assessment as well as facilitating communication and sharing of ideas among students and their teachers in terms of receiving feedback and questions although with some problems like technical difficulties for blogging, spirit of individualism and privacy issues (Chen & Bonk, 2008). In Tanzania, no literature was found by the researcher explaining the use of blogs in instruction and learning.

Literature (such as Moore & Tait,2002; Zhang ,2001), stress that, television and radio has been used in China since 1960s to provide higher education through the use of educational television channels operating at national and regional levels. To the contrary television and radio has not been used in Tanzania in higher learning institutions as reported by Senzige and Sarukesi (2003). However, in the 1960s and 1970s, primary and secondary schools were provided with radios to enable them to follow the educational programs designed by the Ministry of Education in collaboration with Radio Tanzania Dare-es-Salaam (RTD). Sometimes in the 1970's these programs stopped and since then there have hardly been any significant efforts to promote the use of radio and television in schools, not even after the spread of television technology in Tanzania, which started in 1994.

Both China and Tanzania still make use of printed materials in facilitating distance learning, although they can vary in extent to which those printed materials are used within those countries (Zhang ,2001; Moore & Tait,2002;Maro,2008;Nihuka, 2008).

Ng'umbi, (2009); and Mnyanyi, et al. (2009) reported that students of Open University of Tanzania have been using mobile phones to facilitate communication among them and regional centres staffs and to read online materials despite the hidden cost to students and small capacity of their phones to read some documents like PDF files. However, Nihuka and Voogt, (2011) found that despite that mobile phones are owned by majority of students and instructors, both instructors and students confirmed that those mobile phones are not used for delivery of courses and communication. This gives the impression that mobile phones facilitate communication among students themselves and regional centres, by means of administrative staff and not their instructors.

Emails have been used in China to facilitate communication among students themselves and their instructors, to submit assignments to their teachers and to post e-learning materials for students to read (Lee, 2004; Guo & Cai, 2006).

Audiotapes, CDROMs, and videotapes are reported to be used both in Tanzania and China (Zhang, 2001; Maro, 2008). Audio cassettes and radios are used to a lesser extent in China. The situation seems to be the same in Tanzania although it should be noted that, in Tanzania, CDROMs are not much used because of the limited facilities to read those CDs, while in China they are not much used because they have other alternative technology to use.

The other form of technology found through literature is Moodle which is a free and open software platform. Moodle can be used to offer a variety of functions like to upload and share material, chats, quizzes and surveys, gather and review assignments, and recording grades. It is reported to be used in both Tanzania and China. However, till March 2011, most of the courses at Open University of Tanzania were not uploaded in the Moodle, implying that there is minimal use of Moodle at the Open University of Tanzania for teaching and learning.

Lastly, according to Guo & Cai (2006) the rate of using powerpoint and projectors in Chinese Higher Learning Institution was 96.8%, and discussions in bulletin boards was 19.7% in 2004.

3.2 Institutional factors to support technology based instruction

The institutional factors are important for the effective implementation of technology based instruction in ODL (Farrell, 1999). This constitutes aspects like human resource, organizational policies and Institutional capacity to technological infrastructure.

3.2.1 Human resource

According to WST model of technology integration, there are three key factors for successful integration of technology which are will (attitude), skill (technology proficiency) and tool (access to technology tools). For the three factors, attitude is recognized as important, but skills appears to be the strongest of all (Knezek, Christensen, & Fluke, 2003; Agyeyi, & Voogt, 2010). Contrary to WST model of technology integration, most of teachers and instructors in developing countries have been introduced to basic technology competencies, but they lack pedagogy skill to use technology in instruction even if they have access to computers and internet (Chapman, Garrett, & Mahlck, 2004; Sife, et al., 2007; Pelgrum & Anderson, 1999).

For example, in 2009 it was reported by Kajuna that even though instructors are positive regarding the use of technology in education, most of academic staffs at University of Dar es salaam lack enough knowledge to use technology in teaching; the same also applies for most of OUT staffs (OUT, 2009(a); Nihuka & Voogt, 2011). The same was reported in China by Hu (2005) although the extent of this may be different because China started to offer educational technology as a field of study at undergraduate to PhD level for many years now contrary to Tanzania. However, on-job training if designed properly can be useful to improve instructors' pedagogical knowledge on how to use technology to improve teaching and learning to distance learners at low cost. Generally, despite positive attitude of teachers and students towards technology use in education, it's important to recognize that there are other factors that can influence or affect the practice.

3.2.2 Organizational policies

Mitrano (2011) asserted that, policies and plans within the institution provide conducive framework for implementation of day to day activities. In Tanzania, OUT formulated the new policy in 2009 to govern and guide ICT issues like ICT skills training, and on-line distance learning and teaching among other things (OUT (a), 2009 p. 10). To ensure implementation of the ICT policy, OUT formulated the e-learning implementation strategy with the objectives of promoting the use of e-learning, design e-learning environments, develop e-learning and implement e-learning.

3.2.3 Institutional capacity to Technological infrastructures

This is all about teachers and students' access to physical and technological resources to support technology based instruction within a particular institution. The technologies in institution website, computers, mobile phones, internet, video, radio and television. Sife, et al.(2007) stated that, in Tanzania's higher learning institutions, teachers and students have access to internet, computers, mobile technology like mobile phones, audio CDs and DVDs. However that access is very minimal. For example at Open University of Tanzania, it was pointed out by Nihuka and Voogt (2011) that due to shortage of computers, staffs share one computer in an office with 4-5 officemates, and for students the situation is worse because the number of computers is

insufficient compared to the number of students. In China about 80% of higher learning institutions had access to computers and internet in 2006. About 76.6% of offices, 42.2% of classrooms, 49.4% of dormitories of all higher learning institutions have connection to internet. Basing on that, almost every Normal University in China is operating in a dual mode system, of distance and conventional education (Guo & Cai, 2006) such that by 2004, there were 67 universities engaged in distance education plus one Open University in China. Thus infrastructures in these institutions contribute to effective technology instruction in ODL.

Even though infrastructures are not enough to match with the number of staffs and students both in China and Tanzania, still the existing ones, if used properly, can help to promote and implement technology based learning and instruction. Those infrastructures can play roles like improving communication, uploading and downloading e-learning materials hence create more flexible learning environment.

3.3 Challenges and opportunities of technology use in education

3.3.1 Opportunities of Technology in Education

ICTs have the potential for increasing access to and improving the relevance and quality of education. It, thus, represents a potentially equalizing strategy for developing countries. Moore and Tait, (2002) emphasize on that, as they said “...*ICT created wealth of information that was never possible in the classical model.*” They even went further and added that technology facilitates interaction between students and instructors and also helps instructors to be creative and able to develop very interesting course materials through electronic courseware development.

In addition, according to Jung (2008) technology has the potential of improving quality of education, increasing access to education, pedagogical innovation and creating high market value. By pedagogical innovation this refers to the use of learner centered approach in social constructivism learning environment whereby learners will construct new knowledge collaboratively and building global learning community to create knowledge through the use of multimedia resources. Quality improvement involves improved support and effective communication based on learners needs and learning process. In increasing access, ICT expands the learning opportunities as people will be able to learn anytime and everywhere. This will lessen the gap in education by reaching to remote, underdeveloped and marginalized population.

3.3.2 Challenges of Using Technology in Education

Although the opportunities of using technology in education are recognized, technology has not been effectively integrated into everyday teaching activities (Guo, & Cai, 2006). The practice still relies on the single pathway of the school or college without multiple approaches to build up ICT use in education through families, communities, libraries, ICT training centres, and research institutes. Traditional means of teaching and instruction still dominate, especially in developing countries (Hu, 2005).

In developing countries, it has been observed that access to internet is very expensive in case of connection and the hidden cost to end-user in accessing the internet. Thus, to ensure equity to access internet is very difficult. On the other hand, teachers lack technical and pedagogical skills to use technology in instruction even if they have access to internet and fear of inappropriate internet content that may have negative impact to local culture and ideologies from Western countries (Chapman, et al.2004).

In addition to the above challenges in developing countries, Sife, et al (2007) found challenges like awareness and attitudes towards ICT, inadequate funds for staff development and infrastructure development, insufficient of qualified staffs, and lack of systematic approach to ICT implementation in case of using the existing infrastructures already in place.

In China, such challenges include lack of pedagogical skills for instructors to use technology in instruction (Hu, 2005; Guo & Cai, 2006), regional differences in education and technology resources allocation and development whereby rural and western part of China is less developed (Li, 2005; Lee, 2004; Zhang, 2007), internet access is relatively expensive (Xialin, 2008; Tang, 2000) and shortage of technology and educational infrastructures and resources to meet the demand of newly reformed curriculum in the need of quality education (Hu 2005; Guo & Cai, 2006; Chen & Bonk, 2008).

Not only that, but also some ideological, cultural and political issues pushed the government to interfere with the management of the internet. There is a strict limitation of information flow on the internet and even the access is blocked to some foreign websites (Lee, 2004; Guo & Cai, 2006). Pedagogical culture of test driven education system in China, and teacher centered approach also have been pronounced as challenges as technology based instruction foster learner centered approach with great emphasis of problem solving and knowledge construction (Lee, 2004; Zhang, 2007; Chen & Bonk, 2008), and lastly lack of locally produced software as the emphasis is more on hardware thus neglecting software, and more on construction neglecting application (Hu, 2005; Xialin, 2008).

The situation in Tanzania is not quite different from other developing countries. Studies such as (Nawe, 2000; Swarts and Wachira ,2010); Kajuna,2009; Ndume, 2008) show that the challenges of technology instruction in Tanzania includes, lack or insufficient technical and academic staffs with appropriate skills of technology use, unsupportive mindset, electricity connectivity and reliability as well as telecommunication network, expensive cost of internet access and low internet speed, lack of content that meet user's expectation especially to some government and local institution websites which demoralize users to search online content, shortage of technological resources and infrastructures and traditional culture of education and learning styles.

3.4 Strategies Used To Overcome Those Challenges

There are various initiatives, practice and strategies used to address those challenges so as to improve technology based instruction. According to Tinio & Browne,(n.d) and Sharma, (2009) those strategies invite teacher professional development on pedagogical use of technology, sharing of content and information through education network, private and public partnership in ICT funding and development of quality education online resources in local languages.

In China for example, in order to increase personnel with qualified skills, educational technology has been taught as a field of study from undergraduate to PhD level for years now (Fuyin & Jianli, 2010). Chinese National Teacher Training Programme is also implemented based on the national educational technology standards for teachers so as to improve teachers' awareness and skills on how to use and apply ICT in teaching and learning (Zhao & Xu, 2010). Not only that but also, they offer courses in ICT and integration of ICT from primary level of education to develop students interest and awareness on ICT, to understand and master basic ICT skills, and make them realize the impacts of ICT on daily life (Hu, 2005). However, due to underfunding, institutions are charging students separate ICT training fees so as to increase resources and maintenance (Guo & Cai, 2006). All these focus on improving ICT skills and mindset change as

one will be comfortable to use technology if he has basic skills on how to operate and use the technology.

In Tanzania especially at OUT, there is an emphasis on ICT training to staffs but there is no coordinated efforts at university level to encourage students and instructors to use computer and internet for instruction. It is the task of an individual instructor and students in their course (Nihuka, 2008). Almost the same idea was observed by Maro (2008) that even though computers are not enough, instructors use internet for general browsing, electronic mail, research and for e-material development, and not for teaching students via learning management system and voice over internet protocol, although some instructors give electronic reference to students. This is surprising because apart from incentives and rewards outlined in some guiding documents, for the innovative and effective use of educational technology like extra pay for the course developed and uploaded into Moodle, still the practice is not satisfactory.

Another strategy to overcome the bandwidth challenges at OUT as reported in Nihuka (2008) and Nihuka & Voogt (2011) is the use of offline Moodle (LMS) to deliver courses in an ODL setting, supported by emails and mobile phones communication. Besides overcoming challenges of bandwidth, the strategy was effective in terms of enhancing delivery of courses, course outlines and learning resources and in improving interactions and communication between teachers and students.

4. Methodology

This descriptive study employed a cross sectional survey research design to investigate challenges and opportunities of technology based instruction at CCDE and OUT. Participants were instructors (OUT=22; CCDE=10), students (OUT=57; CCDE=47) and technical staffs (OUT=4; CCDE=4) making total of 144. Data collection instruments were *close-ended questionnaire* as the main research instrument to collect information from students and instructors in both countries. There were questions which required yes/no answers; some required ranking and others organized in Likert scale. Then, *focus group discussion* was conducted to collect qualitative data from technical staffs from both countries.

5. Results and Discussion

5.1 Access to Different Forms of Technology and Their Uses

5.1.1 Access to different forms

The respondents were given a list of various forms of technology from which they were supposed to choose those they have access to. The list included computer, internet/intranet, videotapes, audiotapes, DVDs/CDs, video conferencing, mobile telephone and television/radio. The results show that students and instructors from both institutions have access to computer and internet at large (computer for about 90% ; internet, students =CCDE 88.9%; OUT 89%) and instructors (CCDE 100%; OUT 90.9 %).The access to videotapes varies from 88% students and 66% instructors of CCDE to 40% students and 18.2% of instructors from OUT. Audiotapes are accessed at large by students (87%) and instructors (66%) from CCDE compared to 40% students and 31.8% of instructors from OUT. DVDs/CDs are accessed by majority of CCDE students and instructors (about 90% and above) compared to only 60% of students and 54.5% instructors from OUT. Videoconferencing is less accessed by OUT students (10%) and instructors (13.6 %) compared to students (81%) and instructors (77%) from CCDE. Majority of

the participants (more than 80%) from both institutions have access to mobile phones and more than 70% from both institutions have access to television/radio.

That is to say, apart from computer and internet, CCDE instructors and students have access to multiple forms of technology useful for learning than OUT respondents like videoconferencing, videotapes, and audiotapes. Other forms like computer, internet, mobile phones, Television/Radio and DVDs/CDs are accessed by both CCDE and OUT respondents although with a varied degree (CCDE being high).

5.1.2 Access Point of Computer and Internet

The respondents were given the names of different places from which they were supposed to choose the place where they have access to computers and internet. The results depict that, 100% of students and instructors from CCDE have access to internet and computer at their working places (office) compared to 60% of students and 95.5% of instructors from OUT. Apart from office, again majority of students (83%) and instructors (90.0%) from CCDE can access the internet from the regional/study centres compared to only 48% of students and 75% of instructors from OUT. The other access point is university library where 55% of students and 90.0% of instructors from CCDE can access the internet compared to 77% of students and 90.9% of instructors of OUT. Over 90% of students and instructors from CCDE have access to internet at their home while only 50% of students and 81.8% of instructors from OUT have internet access at their home. Lastly internet café as access point is used by 71% of students and 90.0% of instructors from CCDE while in OUT, 79% of students and 86.4% of instructors can access the computer and internet at commercial internet café.

Generally the findings demonstrate that OUT instructors and students have access to computers, internet, Television/Radio and mobile phones at large, although their counterparts have access to multiple technology forms like computers, internet, mobile phones, TV, CDs/DVDs, and video conferencing. Either CCDE students, instructors and OUT instructors have multiple access points for computers and internet like at working places, at home, at university library, or commercial internet centres. OUT students have access mainly at commercial internet café with limited access to computers and internet at their working place, at university library and study centres due to insufficient number of available computers in relation to number of students. This could have resulted into instructors at OUT to be main implementers of technology based instruction at large so as to motivate students to shift to e-learning; surprisingly this is not the case. This might have negative impact to students' effort to own computers (even for those who can afford) as they find computers to be of no use to them as they are not pressed to read e-learning materials.

5.1.3 Uses of available resources for teaching and learning

To determine what technological forms has been used for learning, respondents were given a list of educational technology forms from which they were supposed to indicate whether they have been using a particular technology for learning or not. The results reveal that majority of students and instructors from both institutions use computers and internet for general learning activities although with a varied extent, as that of CCDE being high (100% for CCDE respondents and about 90% for OUT respondents). Mobile phones also have been used by students and instructors from both institutions to pass the needed information to facilitate instruction and learning process within their institutions. Video tapes, audiotapes; DVDs/CDs; videoconferencing; TV and radio have been used for learning and instruction by (more than a

half) of students and instructors from CCDE while at OUT they are less used by less than 14% of students and 9.1% of instructors.

Generally, respondents from both institutions confirmed to use computers, internet and mobile phones either for learning or other activities associated with learning. However, it is vivid that, computers and internet have been used as the main form for education delivery within CCDE institution than OUT, as their students have to access learning materials online. Again unlike OUT, CCDE practice blended learning by incorporating other forms of technology in learning like audiotapes, videotapes, DVDs/CDs, videoconferencing, TV and radio. In addition, it was noted that OUT students and instructors favor the use of LMS (learning management system like Moodle, although courses are minimally uploaded), DVDs/CDs, and mobile phones for learning purpose, whereas CCDE prefer LMS (existing educational platform), DVDs/CDs and videotapes.

5.1.4 Specific uses of computers and internet

Basing on the findings on the specific uses of computers and internet, CCDE students use computers frequently for learning and other activities associated with learning than OUT students. CCDE students use computers and internet mostly for searching study materials, email communication and word processing than presentation, database and learning. On the other side, OUT students mostly use computers and internet for searching learning materials and rarely for word processing, communication, learning through Moodle or presentation.

CCDE instructors specifically use computers and internet frequently for communication, searching learning materials, providing assignments and course outlines and presentation than other activities like setting and processing exams, developing study materials, counseling students, as well as teaching and learning through the online educational platform. On the other side, although OUT instructors indicated to use computers and internet for teaching specifically, have been used for searching learning materials, communication (through staff email system) and setting examinations than developing study materials, providing assignments/course outlines to students, presentation, and processing examination results. They also confirmed not to use computers and internet for counseling or teaching and learning through Moodle and this is proved by a small number of courses uploaded into Moodle. However, the extent of using computers and internet for CCDE instructors is higher (frequencies lie between throughout and 5-4 times per year) than that of OUT instructors which lie between 5-4 times per year and 3-2 times per year. As Maro (2008) emphasized, availability of electronic resources at OUT does not guarantee their utilization in instruction and learning.

It is clear that, print materials still dominate the mode of delivery of learning materials at OUT than CCDE. There is no single answer to which technology is the best to all situations, however, a careful combination of different media can minimize the weaknesses of those technology and produce better learning results (Perraton, et al;2002). Thus as Nihuka (2008) and Ng'umbi (2008) suggested, along with print, computers and internet, there is a need to integrate different technology like DVDs/CDs, mobile phones and audiotapes to deliver learning materials to students and facilitate communication and interaction among students and their instructors.

5.2 Institutional environment

The findings show that, the instructors from both institutions are not familiar with ICT plans and policies within their institutions. It seems that they perceive those issues as administration matters and feel like they are not part of them. May be those plans and policies were developed

without instructors' participation in any way, or for China, may be this is apparent to what was observed by Guo & Cai (2006) that most of the institutions in China do not have institutional ICT implementation strategy, thus they sorely depend on guidelines from the government.

However, apart from being unaware of such plans, surprisingly, CCDE instructors are doing well than OUT instructors regarding the issue of technology based instruction. This can be attributed to China government's efforts on setting guidelines, action plans, policies and putting priority in technological infrastructure development (Xingfu, Xiaoqing, & Zhiting; 2005). For example, according to Feiy, and Gilsun, (2007) after the establishment of CERNET in 1994, there are some plans established by China government to emphasize the use of technology in education like Information Concerning University Development of e-Learning policy which supported the development of e-learning system; Blueprint of the National Committee in e- Learning Education Transfer System Technology which guided the building of digital satellite and computer networking. Apart from the national policy on technology use in education, OUT has developed institutional ICT policy and implementation strategy which provide opportunities and motivation for instructors to engage in technology based instruction and learning. However, as noted earlier, instructors are not aware of the content though despite the situation, at CCDE e-learning is highly embraced.

Table 1. Mean score for Instructors' awareness to the content of existing ICT documents within their institutions

DOCUMENT	CCDE(CN)		OUT(TZ)	
	*M	SD	*M	SD
ICT strategic plan	1.5	1.0	1.8	0.7
ICT policy	1.9	1.4	2.1	0.9
ICT implementation strategy	1.8	1.3	1.9	1.0

*Scale; 1=don't know; 2=I have received but not read it; 3=I have read it but unclear;4=I have read it and it is clear

5.3 Perceived opportunities of technology based instruction

These are opportunities of using technology in education as perceived by respondents in terms of benefits. Results show that students and instructors from both institutions are positive regarding the use of technology and perceive technology to have the potential of increasing opportunity in education in term of making students responsible for their learning, strengthening the relationship between theory and practice, adapting students learning styles to educational process, to make learning fun and enjoyable, to increase flexibility in learning, to improve course delivery, to improve student support services, to improve feedback to students and communication/ interaction among students and their instructors.

5.4 Challenges of technology based instruction

This result align with those of Nihuka (2008), Ng'umbi (2009), Mnyanyi et al (2009) and Maro, (2008), all of which found that OUT students and instructors seem to face challenges like limited computers and internet access points, unsuitable computers in terms of their capacity and speed, insufficient number of computers to use, insufficient technical support and experience to use some of the computer applications. Responding to challenges, OUT technical staffs added issues

like lack of feedback from end-users (instructors and students); power breakdown; and minimal cooperation from instructors as they are reluctant to shift to new technology.

In other way, shortage of qualified technical staffs and slow internet connectivity seem to affect both institutions, though with varied magnitude. The situation is different within Tanzania and China according to differences in the level of economic and technological development. CCDE has built infrastructure with relevant hardware development, begun to prepare teaching resources and now is just implementing contemporary distance education with established education platform while OUT is still struggling with infrastructure and hardware development. Although issues of access has been mentioned in other parts of China (Hu, 2005) at CCDE this is not the case. Specifically, apart from above two challenges they also face issues like outdated hardware, lack of locally produced software (Zhang, 2007), and communication issues among stakeholders of technology learning within the institutions as they belong to different departments.

5.5 Strategies to negotiate with those challenges

The findings show that CCDE and OUT face same challenges although those challenges differ in kinds and magnitude. This led to those institutions to adapt different strategies to address those challenges to improve technology based instruction. Results show that CCDE instructors are actively using strategies like providing online and e-learning study materials to students, and also encouraging online communication with students. Nihuka (2008) found that, at OUT there are no formal or coordinated efforts to encourage students to use the existing technological resources for learning, as it is the personal efforts of instructors and students in their respective courses. This is even apparent to this study as results on the different use of computers for OUT instructors imply that instructors don't use computers to prepare e-learning study materials or for online facilitation. This has implications for strategies used to encourage technology based learning for students as it seems e-learning materials are not provided to a large extent to make students active, nor are online materials provided for further references.

The other strategy used by both institutions is to provide training (to students and instructors) on how to use technology/education platform. However, this seems to be different on the way training is organized by CCDE and OUT. For example, CCDE confirmed to use frequent training at least once a year to every instructor and student, followed by close technical and pedagogical support, while OUT mostly use one session seminar (of about 3-5 days for every instructor) and orientation training to new students. It is not clear on the effectiveness of the pedagogical support provided to instructors because as it was also observed by Nihuka (2008) most of the IT staffs have only technical knowhow without pedagogical know how.

According to literature, (such as Xingfu et al, 2005; Hu, 2005) in China ICT use in education is developed on the basis of its achievement in area of instructional technology and pedagogy use of ICT. Even training programme of instructors and teachers is of integrated parts of ICT skills, instructional design of e-courses and pedagogy use of technology. OUT training programme seem to be centered on the general use and proficiency of technology instead of its integration into instruction and learning as a result instructors end up improving their personal computer skills and not pedagogy use.

Moreover, according to Lara (2006), instructors need sufficient time to gain experience with new technology use (especially in education), to share experience and to use effectively technology for instruction. According to literatures (Lara, 2006; Xingful, et al, 2005; Wood et al, 2005; and Nihuka 2008), for OUT seminars to be effective on the implementation of technology based

instruction, after training, there should be a follow-up for technical and pedagogical support for instructors to be competent and confident to use technology for instruction.

In addition to effective training, results depict that CCDE institution use cooperation and partnerships with public and private companies in terms of sharing technical resources. This was also reported by Xingfu et al, (2005) that cooperation with private enterprises helped infrastructure development and that within universities this has improved the sharing of resources and information in China. According to literature (Tidio, nd; Perraton et al,2002), it's sometimes difficult for a single institution to carry out all the necessary activities due to limited resources both in terms of human and financial. This calls for partnership and cooperation with other institutions within the nation, region / beyond frontiers to cut down running costs as it will be easy to share teaching materials, technology, as well as to get professional advice and consultancy. For example, OUT can establish a partnership with Teachers' Training colleges scattered all over Tanzania to allow OUT students to use computers and internet labs; or with mobile phones companies/ broadcasting companies to share their network services at a reasonable cost which will benefit both sides.

6. Conclusions

Based on the results of the study, here are conclusions drawn:

CCDE is more advanced regarding the use of technology in facilitating communication, delivery of e-learning materials and improving students' learning than OUT. This is attributed to their access to different forms of technology and multiple internet access points than OUT respondents.

Advancement in instructional technology, continuous teacher professional development and continuous technical and pedagogical support also has helped CCDE instructors to use technology effectively in instruction.

Computers and internet are the dominant e-learning technology at CCDE along with print, CDs/DVDs, audio/videotapes and Television, whereas at OUT the print is the main form of delivery and e-learning materials are minimally uploaded to the institution's education platform.

CCDE respondents seem to use computer and internet mostly for learning and activities associated with learning than OUT respondents. Specifically CCDE respondents use computers and internet for communication, searching learning materials, providing assignments/course outlines and presentation than other activities like setting and processing exams, developing study materials, counseling students, as well as teaching and learning through the online educational platform. However, OUT use computers and internet (for lesser extent) for searching learning materials, communication (through staff email system), and setting examinations and not for counseling or teaching and learning through Moodle.

Instructors from both institutions demonstrated minimal understanding of the policies, plans and implementation strategies within their institutions. Although, it seems those plans and policies have less effect to teachers in using technology in education, because regardless of being unaware about policy content, CCDE instructors are fully inved in technology based instruction.

Students and instructors from both institutions have positive attitude and basic ICT skills necessary for using computers and internet for technology based instruction and learning.

At OUT, instructors have multiple accesses to computers and internet than students.

OUT seem to be more affected by limited access to technological infrastructures, insufficient pedagogy skills to use technology, shortage of technical and education technologist staffs, and slow internet connection. CCDE mostly are affected by slow internet connection, and shortage of qualified technical personnel.

Generally, apart from the limited access to computers and internet, OUT participation in technology based instruction is not satisfactory compared to CCDE.

7. Recommendations:

7.1 For CCDE and OUT management

There should be regular discussions on institutional ICT policy, plan and implementation strategies with instructors, management and technical staffs to make them aware of those guidelines.

OUT management should learn from CCDE and adapt frequent training programme and provision of continuous technical and pedagogy support to instructors.

OUT management should learn from CCDE strategy of cooperation and partnership with public and private companies in e-learning in sharing network, professional advice/consultation as well as resources in terms of computer labs, e-learning materials and human.

OUT and CCDE management should make maximum use of blended learning technology by incorporating the use of CDs/DVDs, and mobile phones to improve communication and e-learning materials delivery especially under slow internet connectivity or limited access to computers and internet.

For the sake of minimizing running cost, OUT management should think of introducing user fee charges to OUT students when accessing internet at computer labs.

7.2 For further research

There is a need of doing a large scale study on how mobile devices can be used in ODL to improve communication and increase access to e-learning materials.

In addition, there is a need to find out how professional development programs regarding instructors' use of technology in education can be designed and implemented effectively.

Lastly, there is a need to study the feasibility of technology partnership and how it can be established between OUT and mobile phone companies; teachers' colleges, and other universities to facilitate sharing of resources and minimizing cost.

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